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HARNESS, DICKEY & PIERCE, P.L.C.
P.O. Box 8910
Reston, VA 20195

EXAMINER	
ODOM, CURTIS B	
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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/651,200	Applicant(s) LEE ET AL.	
	Examiner Curtis B. Odom	Art Unit 2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *29 August 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *02 April 2004 and 29 August 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. Claims 3 and 18 are objected to because of the following informalities:

a. In claim 3, the phrase "the method of claim" is suggested to be changed to "the method of claim 1".

b. Claim 18 should end in a period.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1, 2, 6-8, 10, 11, 13, and 15 are rejected under 35 U.S.C. 102(e) as being anticipated by Miya (US 2002/0137548).

Regarding claim 1, Miya discloses a method of detecting a random access channel (RACH) preamble in a received uplink signal which is used to determine weighting (see section 0023), comprising:

spatially processing the uplink signal by calculating weights based on a direction of arrival of the uplink signal (see section 0028-0029) and applying these weights to the received uplink base band signal through multipliers (see section 0037) and temporally processing an uplink signal received at one or more receive antennas (AAA) as shown in Fig. 5 which contains data related to a random access channel (RACH) preamble (see section 0038), wherein the signal is temporally processed to detect the random access channel preamble by correlating the RACH preamble with already-known RACH preamble codes (see section 0038) and comparing the correlation (peaks) to a threshold to detect the receiver RACH preamble (see section 0039).

Regarding claim 2, Miya discloses spatially processing the uplink signal in Fig. 5, elements 104-106 by calculating weights and applying these weights to the received uplink base band signal through multipliers prior to temporal processing by use of correlation in Fig. 5 section 108 (see Fig. 5).

Regarding claim 6, Miya further discloses spatial processing includes multiplying the received uplink base band signal by a group of weights (W1) (see section 0037) which represent a weight vector.

Regarding claim 7, Miya further discloses the group of weights are a function of the direction (angle) of arrival of the uplink signal with respect to the number of signals (users) received by the antennas (see section 0028), wherein the weights are a function of two or three antennas (see sections 0023-0024) which receive the uplink signal.

Regarding claim 8, Miya further discloses the received antennas are configured as a uniform linear adaptive antenna array (AAA), wherein the antennas are in a linear parallel configuration as shown Fig. 5 (see also sections 0002 and 0023).

Regarding claim 10, Miya discloses a method of detecting a random access channel (RACH) preamble in a communication system (see Fig. 5), comprising:

spatially processing an uplink signal received at one or more antennas (AAA) which contains data related to an RACH preamble (see section 0023) by calculating weights based on a direction (angle) of arrival of the uplink signal (see section 0028-0029) and applying these weights to the received uplink base band signal through multipliers (see section 0037) to output a spatially processed signal, wherein the weights are a function of the direction (angle) of arrival of the uplink signal with respect to the number of signals (users) received by the antennas (see section 0028); and

temporally processing (see Fig. 5, block 108) the spatially processed uplink signal received at one or more receive antennas (AAA), wherein the signal is temporally processed to detect the random access channel preamble by correlating the RACH preamble with already-known RACH preamble codes (see section 0038) and comparing the correlation (peaks) to a threshold to detect the receiver RACH preamble (see section 0039).

Regarding claim 11, Miya further discloses spatial processing includes multiplying the received uplink base band signal by a group of weights (W1) (see section 0037) which represent a weight vector, wherein the group of weights are a function of the direction (angle) of arrival of the uplink signal with respect to the number of signals (users) received by the antennas (see section 0028), wherein the weights are a function of two or three antennas (see sections 0023-0024) which receive the uplink signal.

Regarding claim 13, Miya further discloses the spatial processing includes multiplication by a group of weights (W1) (see section 0037) which represent a weight vector and accumulating the multiplications at an adder (see Fig. 5, adder 106b and see also section 0037).

Regarding claim 15, Miya discloses an arrangement for detecting a random access channel (RACH) preamble in a communication system (see Fig. 5), comprising:

spatial processing means (see Fig. 5, blocks 104-106) for spatially processing an uplink signal received at one or more antennas (AAA) which contains data related to an RACH preamble (see section 0023) by calculating weights based on a direction (angle) of arrival of the uplink signal (see section 0028-0029) and applying these weights to the received uplink base band signal through multipliers (see section 0037) to output a spatially processed signal, wherein the weights are a function of the direction (angle) of arrival of the uplink signal with respect to the number of signals (users) received by the antennas (see section 0028); and

temporal processing means(see Fig. 5, block 108) for temporally processing the spatially processed uplink signal received at one or more receive antennas (AAA), wherein the signal is temporally processed to detect the random access channel preamble by correlating the RACH preamble with already-known RACH preamble codes (see section 0038) and comparing the correlation (peaks) to a threshold to detect the receiver RACH preamble (see section 0039).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Miya (US 2002/0137548) as applied to claim 1, and in further view of Branlund et al. (US 2003/0086366).

Regarding claim 3, Miya does not disclose the received uplink signal is subject to temporal correlation prior to spatial processing of the temporally correlated signal.

However, Branlund et al. discloses a method of detecting a preamble in a communication system, comprising: subjecting an uplink signal (see sections 0008-0009) received at one or more receive antennas of a base station and containing data related a preamble to temporal correlation by multiplying (correlating) the received preamble signal with a scrambling code (see section 0146) to output a signal representing a subcorrelated signal; and spatially processing the signal using a FFT (see section 0146) after temporal correlation which detects users in a given partition (direction) (see section 0150) to output a spatially processed signal, wherein the output of the FFT is used to detect the preambles (see section 0146). Therefore, it would have been obvious to one skilled in the art at the time the invention was made to provide temporal processing prior to spatial processing in Miya as disclosed by Branlund et al. since Branlund et al. states detecting a preamble in this manner allows higher throughput on the transmission channel, which can reduce user latency (see section 0148).

6. Claims 4 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miya (US 2002/0137548) as applied to claims 1 and 11, and in further view of Bhatoohaul et al. (U. S. 7, 076, 015).

Regarding claim 4, Miya does not specifically disclose the preamble contains a user-specific preamble signature sequence.

However, Bhatoohaul et al. discloses creating a RACH preamble which includes a user specified preamble signature (see column 4, lines 45-54). Therefore, it would have been obvious to one skilled in the art at the time the invention was made to modify the preamble of Miya with the preamble signature sequence as taught by Bhatoohaul et al. since Bhatoohaul et al. states detection of preamble sequence may allow rapid detection and demodulation of data signals in channels randomly accessed by multiple users (see column 4, lines 23-26).

Regarding claim 12, Miya discloses temporally processing by means of correlation the spatially processed signal includes:

subjecting the spatially processed signal (preamble) to temporal correlation using matched filter as described in section 0038 to output at least one correlation calculation representing a subcorrelated signal, wherein the correlation calculation includes an existing weight (coefficient) (see section 0033) formed by the given received antenna (see section 0023) in a given directivity pattern (see section 0036) toward given users; in other words, the existing weight forms a directivity pattern (direction) for the antennas for a group of users (channels) as described in section 0023;

calculating a detection level of a correlation peak (see section 0039) representing a decision statistic from the correlation calculation;

comparing the calculated detection level to a set threshold value (see section 0039); and

detecting a received random access channel (RACH) preamble if the detection level equals or exceeds the set threshold value (see section 0039).

Miya does not specifically disclose the correlation calculation (subcorrelated signal) contains a user-specific random access channel preamble signature sequence and data related to transmitted chip energy of the preamble signatures.

However, Bhatoohaul et al. discloses creating a RACH preamble which includes a user specified preamble signature (see column 4, lines 45-54), wherein the signature sequence is spread with a 256-chip code sequence. Therefore, it would have been obvious to one skilled in the art at the time the invention was made to modify the preamble of Miya with the preamble signature sequence including data related to the transmitted chip as taught by Bhatoohaul et al. since Bhatoohaul et al. states detection of preamble sequence may allow rapid detection and demodulation of data signals in channels randomly accessed by multiple users (see column 4, lines 23-26).

7. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Miya (US 2002/0137548) in further view of Bhatoohaul et al. as applied to claim 4, and in further view of Ertel et al. (U. S. Patent No. 7, 031, 290).

Regarding claim 5, Miya discloses the uplink signal includes an existing weight (coefficient) (see section 0033) formed by the given received antenna (see section 0023) in a given directivity pattern (see section 0036) toward given users; in other words, the existing weight forms a directivity pattern (direction) for the antennas for a group of users (channels) as described in section 0023. Miya also discloses the uplink signal includes time delays for directivity patterns for the channels (users) which are calculated in delay profiles (see sections 0031 and 0038). Miya and Bhatoohaul do not specifically disclose the uplink signal includes a

complex Gaussian noise component and the channel weight represents a beam formed by the given receive antenna in a given direction.

However, Ertel et al. discloses receiving an uplink signal as a base station (see column 12, lines 42-53) through an antenna array, wherein the signal includes signals from a plurality of users and Gaussian noise (see column 12, line 63-column 13, line 2). Ertel et al. further discloses a unique set of weights (coeffiecients) for each user applied to the signal, wherein the weights represent different effective antenna patterns (directions), wherein once the weights are applied to the signal, beamforming for the different effective antenna patterns has occurred (see column 13, lines 13-25). The beamformer can be steered in the direction of the current user according to the weight (see column 14, lines 38-41). Therefore, it would have been obvious to one skilled in the art at the time the invention was made to modify the uplink signal of Miya and Bhatoohaul to include a channel weight representing a beam formed by the given receive antenna in a given direction since Ertel et al. states the weight (vector) can maximize the output signal to interference plus noise ratio (see column 13, lines 26-30) in a signal which contains some Gaussian noise (see column 13, line 63-column 13, line 2).

8. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Miya (US 2002/0137548) in further view of Pederson et al. (US 2004/0218569).

Regarding claim 9, Miya discloses a method of detecting a random access channel (RACH) preamble in a received uplink signal which is used to determine weighting (see section 0023), comprising:

spatially processing the uplink signal by calculating weights based on a direction of arrival of the uplink signal (see section 0028-0029) and applying these weights to the received

uplink base band signal through multipliers (see section 0037) and temporally processing an uplink signal received at one or more receive antennas (AAA) as shown in Fig. 5 which contains data related to a random access channel (RACH) preamble (see section 0038), wherein the signal is temporally processed to detect the random access channel preamble by correlating the RACH preamble with already-known RACH preamble codes (see section 0038) and comparing the correlation (peaks) to a threshold to detect the receiver RACH preamble (see section 0039). Miya does not disclose the detected random access channel preamble is indicative of the best cell portion for communicating with the user, wherein the best cell portion being a portion of a cell where a received uplink signal from the user has a highest signal to interference ratio.

However, Pedersen et al. discloses that before a base station (node B) can communicate with user equipment (UE), a best cell portion measurement representing a highest signal-to-interference ratio must be received from the user equipment (see section 0026). Pedersen et al. further discloses this measurement can be performed by introducing a new procedure on the random access channel (see section 0026). A measurement message can be sent for each cell portion. Therefore, it would have been obvious to one skilled in the art at the time the invention was made to modify the random access channel preamble of Miya to represent the best cell portion (measurement) for communicating with the user as disclosed by Pedersen et al. since Pedersen et al. states a best cell portion measurement determines if a new link should be created with user equipment (see section 0026).

9. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Miya (US 2002/0137548) as applied to claim 10, in further view of Posch (U. S. Patent No. 5, 724, 270).

Regarding claim 14, Miya does not specifically disclose the spatial processing is performed using FFT implementation.

However, Posch discloses a method of beamforming (spatial processing) which includes a spatial FFT across sensors (antennas), see column 1, lines 50-67. Therefore, it would have been obvious to one skilled in the art at the time the invention was made to modify the spatial processing of Miya with the spatial FFT beamforming of Posch since Posch states that for frequencies below half wavelength sensor (antenna) spacings, a reduced number of beams can be used which will ensure that the angular coverage of interest is still fully covered (see column 1, lines 38-42).

10. Claim 16, 17, and 19-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Branlund et al. (US 2003/0086366) in view of Miya (US 2002/0137548).

Regarding claim 16, Branlund et al. discloses a method of detecting a preamble in a communication system, comprising:

subjecting an uplink signal (see sections 0008-0009) received at one or more receive antennas of a base station and containing data related a preamble to temporal correlation by multiplying (correlating) the received preamble signal with a scrambling code (see section 0146) to output a signal representing a subcorrelated signal; and

spatially processing the signal using a FFT (see section 0146) which detects users in a given partition (direction) (see section 0150) to output a spatially processed signal, wherein the output of the FFT is used to detect the preambles (see section 0146).

Branlund et al. does not disclose the temporal correlation is based on an angle of arrival of the uplink signal or determining a decision statistic from the spatially processed signal;

comparing the decision statistic to a given threshold; and detecting a random access channel preamble if the decision statistic equals or exceeds the given threshold.

However, Miya et al. discloses performing temporal correlation to detect a random access channel preamble by correlating the RACH preamble with already-known RACH preamble codes (see section 0038) and comparing the correlation (peaks) to a threshold to detect the receiver RACH preamble (see section 0039). The correlation is based on delay profiles (see section 0039) which are obtained from receiving directivities (see section 0031) based on the direction (angle of arrival) of an uplink signal (see section 0028). Miya further discloses the detection of the preamble comprises calculating a detection level of a correlation peak (see section 0039) representing a decision statistic from the correlation calculation; comparing the calculated detection level to a set threshold value (see section 0039); and detecting a received random access channel (RACH) preamble if the detection level equals or exceeds the set threshold value (see section 0039). Therefore, it would have been obvious to one skilled in the art at the time the invention was made to modify the temporal correlation and detection of a preamble of Branlund et al. with the temporal correlation and detection of a preamble as disclosed by Miya since Miya states the temporal correlation and detection allows reduction of transmission power at the communication terminal (user) side (see section 0084).

Regarding claim 17, Branlund et al. further discloses the spatial processing comprises multiplying the uplink signal with a vector P (see Fig. 1, element 6 and section 0146). Branlund et al. does not disclose the vector includes a weight vector that is a function of at least a direction of the angle of arrival of the uplink signal and the number of receive antennas receiving the uplink signal to determine the spatially processed signal.

However, Miya discloses spatial processing which includes multiplying the received uplink base band signal by a group of weights (W1) (see section 0037) which represent a weight vector, wherein the group of weights are a function of the direction (angle) of arrival of the uplink signal with respect to the number of signals (users) received by the antennas (see section 0028), wherein the weights are a function of two or three antennas (see sections 0023-0024) which receive the uplink signal. Therefore, it would have been obvious to one skilled in the art at the time the invention was made to include this feature since Miya states the processing allows reduction of transmission power at the communication terminal (user) side (see section 0084).

Regarding claim 19, Miya further discloses spatial processing which includes multiplying the received uplink base band signal by a group of weights (W1) (see section 0037) which represent a weight vector, wherein the group of weights are a function of the direction (angle) of arrival of the uplink signal with respect to the number of signals (users) received by the antennas (see section 0028), wherein the weights are a function of two or three antennas (see sections 0023-0024) which receive the uplink signal. Therefore, it would have been obvious to one skilled in the art at the time the invention was made to include this feature since Miya states the processing allows reduction of transmission power at the communication terminal (user) side (see section 0084).

Regarding claim 20, Branlund et al. discloses spatially processing the uplink signal using a FFT (see section 0146) which detects users in a given partition (direction) (see section 0150).

Regarding claim 21, Branlund et al. discloses an arrangement (Fig. 1) for detecting a preamble in a communication system, comprising:

a temporal correlation block (see Fig. 1, element 10) for subjecting an uplink signal (see sections 0008-0009) received at one or more receive antennas of a base station and containing data related a preamble to temporal correlation by multiplying (correlating) the received preamble signal with a scrambling code (see section 0146) to output a signal representing a subcorrelated signal; and

a spatial processing element (see Fig. 1, element 12) for spatially processing the signal using a FFT (see section 0146) which detects users in a given partition (direction) (see section 0150) to output a spatially processed signal, wherein the output of the FFT is used to detect the preambles (see section 0146).

Branlund et al. does not disclose the temporal correlation is based on an angle of arrival of the uplink signal or determining a decision statistic from the spatially processed signal; comparing the decision statistic to a given threshold; and detecting a random access channel preamble if the decision statistic equals or exceeds the given threshold.

However, Miya et al. discloses performing temporal correlation to detect a random access channel preamble by correlating the RACH preamble with already-known RACH preamble codes (see section 0038) and comparing the correlation (peaks) to a threshold to detect the receiver RACH preamble (see section 0039). The correlation is based on delay profiles (see section 0039) which are obtained from receiving directivities (see section 0031) based on the direction (angle of arrival) of an uplink signal (see section 0028). Miya further discloses the detection of the preamble comprises calculating a detection level of a correlation peak (see section 0039) representing a decision statistic from the correlation calculation; comparing the calculated detection level to a set threshold value (see section 0039); and detecting a received

random access channel (RACH) preamble if the detection level equals or exceeds the set threshold value (see section 0039). Therefore, it would have been obvious to one skilled in the art at the time the invention was made to modify the temporal correlation and detection of a preamble of Branlund et al. with the temporal correlation and detection of a preamble as disclosed by Miya since Miya states the temporal correlation and detection allows reduction of transmission power at the communication terminal (user) side (see section 0084).

11. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Branlund et al. (US 2003/0086366) in view of Miya (US 2002/0137548) as applied to claim 16, and in further view of Bhatoohaul et al. (U. S. Patent No. 7, 076, 015).

Regarding claim 18, Branlund et al. discloses the scrambled (correlated) preamble signal contains data related to user-specific preamble sequences (signatures), see section 0148. Branlund et al. also discloses the preamble signal contains data related to weights (coeffiecients) representing a beam formed by the given receive antenna, wherein the weights (coefficients) for beam forming are determined from the transmitted preambles (see sections 0178-0180). However, Branlund et al. and Miya do not disclose the scrambled preamble contains a user-specific random access channel preamble signature sequence and data related to transmitted chip energy of the preamble signatures.

However, Bhatoohaul et al. discloses creating a RACH preamble which includes a user specified preamble signature (see column 4, lines 45-54), wherein the signature sequence is spread with a 256-chip code sequence. Therefore, it would have been obvious to one skilled in the art at the time the invention was made to modify the preamble of Branlund et al. and Miya with the preamble signature sequence including data related to the transmitted chip as taught by

Bhatoohaul et al. since Bhatoohaul et al. states detection of preamble sequence may allow rapid detection and demodulation of data signals in channels randomly accessed by multiple users (see column 4, lines 23-26).

Conclusion

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Ertel et al. (US 2002/0067759) further discloses temporal processing prior to spatial processing to detect a signal.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Curtis B. Odom whose telephone number is 571-272-3046. The examiner can normally be reached on Monday- Friday, 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jay Patel can be reached on 571-272-2988. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Curtis Odom
October 11, 2006